



Harvard University
Cambridge, Massachusetts
Volume 9, Number 1
Fall, 1979

MCZ newsletter

MUSEUM OF COMPARATIVE ZOOLOGY

Philip J. Darlington, Jr.

RACCOON RESEARCH

Deedra McClearn's research into the role of fore- and hindfeet in two vital aspects of mammalian existence — feeding and locomotion — has recently received a financial boost from the National Science Foundation. Her grant from the Division of Biological and Medical Sciences (for improving doctoral dissertation research in the field sciences) will allow her to continue her field and laboratory studies on the relationship of structure and behavior in four related species.



Two young raccoons raised in the lab are ready for feeding time.

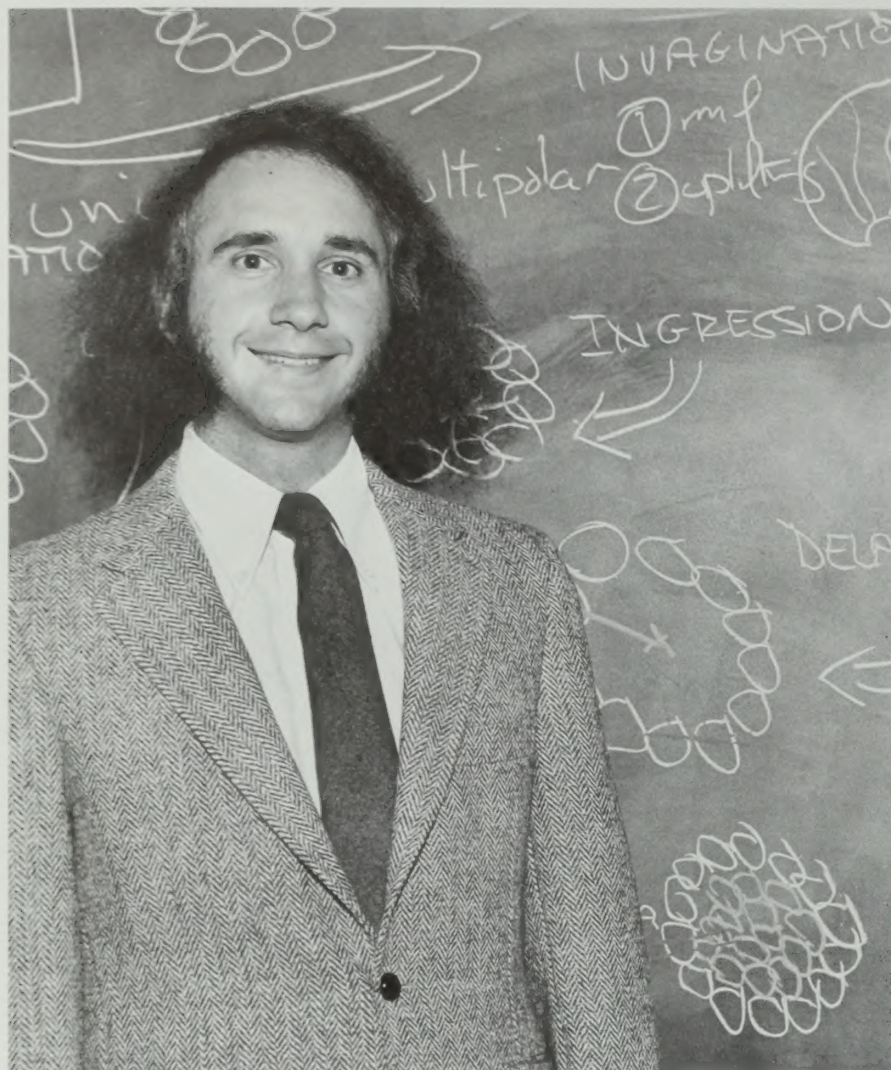


Studying raccoons in New Hampshire, coatis and kinkajous on Barro Colorado Island, Panama, and ringtails in Arizona involves attaching radio collars to the animals and following and filming their movements. For the nocturnal animals, an infra-red camera is used.

In the laboratory the same animals are studied using cineradiography to record joint movements. Combining lab and field data should provide new insights into how these animals work.

Deedra McClearn with her cooperative research subjects.

ROBERT M. WOOLLACOTT RECEIVES NEW APPOINTMENTS



Professor Robert M. Woollacott

Robert M. Woollacott became Professor of Biology and Curator of Marine Invertebrates in the MCZ as of July 1, 1979. He first came to Harvard in 1972 as Lecturer on Biology and subsequently served as Assistant and Associate Curator of Marine Invertebrates, and Assistant and Associate Professor of Biology.

Reproduction and Systematics in Marine Invertebrates

Dr. Woollacott's research centers around problems in the reproduction and systematics of "minor" groups of marine invertebrates. He is particularly interested in a group of three phyla called, collectively, the lophophorates. These include

the Phoronida (20 species), Bryozoa or moss-animals (5,000 species), and Brachiopoda or lamp shells (260 species). Dr. Woollacott is investigating problems of the phylogenetic relationships of these three groups and their overall relationship to that branch of the animal kingdom which ultimately gave rise to the vertebrates (i.e., echinoderms, acorn worms, and sea-squirts). Most of his research concerns moss-animals, a phylum of colonial sessile invertebrates, most of which are marine. Although this group is traditionally considered minor, its 15,000 extinct and 5,000 extant described species make it larger than the mammals!

Biology of Moss Animals

Two aspects of the biology of moss animals have been a main emphasis of Dr. Woollacott's work. First, traditional systematic studies have generated confusing and contradictory systems of classification. By analyzing larvae and their metamorphoses as a new set of characters to be used in conjunction with those of traditional adult anatomy, Dr. Woollacott has found that a systematics based on the larvae and its changes into an adult may reveal more about the evolutionary relationships within the group than systematics based exclusively on the adult.

Secondly, Dr. Woollacott is interested in the origin of coloniality in bryozoans. His theory to account for the development of coloniality involves the alterations in the timing of the appearance of structures during ontogeny.

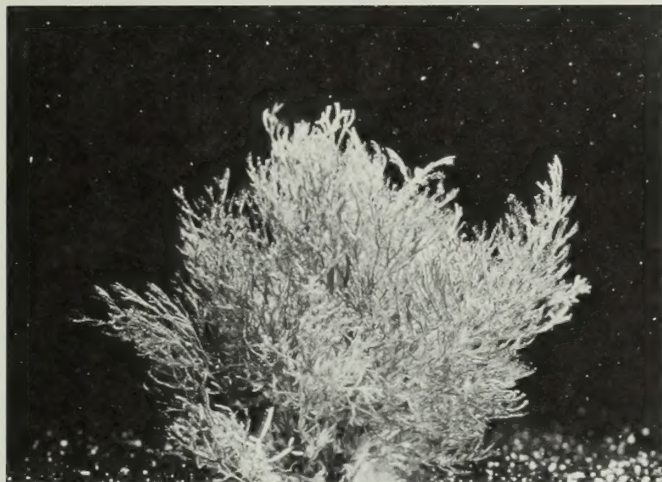
Reproduction and Light

Another line of research investigates how reproduction is synchronized with an animal's environment and how these precise triggering mechanisms may have evolved. Specifically, Dr. Woollacott is studying the relationship between daily changes in light-regime and spawning in sea-squirts (ascidians). These studies range from examinations of entire populations down to the complex internal workings of individual sea-squirts.

Marine Invertebrate Collections in the MCZ

As Curator of the MCZ collections of echinoderms, sponges, and many minor groups of marine invertebrates, Dr. Woollacott and Curatorial Assistant Catherine H. Felton have completed an extensive reorganization of both the sponge and echinoderm collections. The MCZ's echinoderm collections are one of the two best in the world, containing over 200,000 individual specimens and 6,000 designated "type" specimens; a 179 page list of these has been compiled for distribution to specialists. The entire collection has now been inventoried, catalogued, and many groups have been completely reorganized.

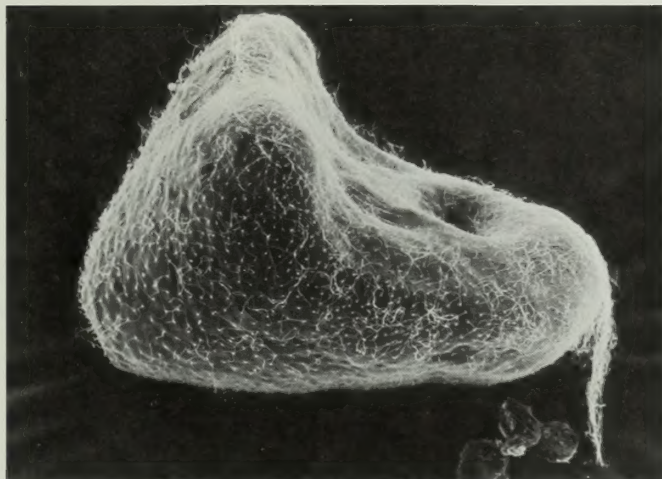
EXAMPLES OF MARINE INVERTEBRATES STUDIED AT THE MCZ



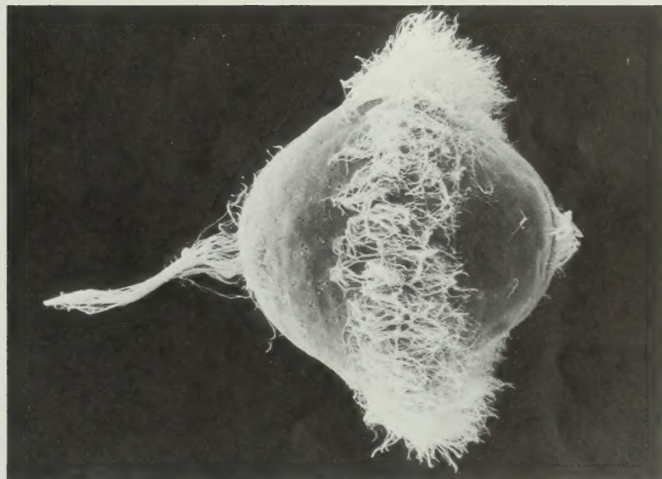
Colony of moss-animal.



Chiton egg.



Early echinopluteus larva of sea urchin.



Trochophore larva of the "inn-keeper" worm.

According to Dr. Woollacott: "When I came to the MCZ, I knew the bryozoans and ascidians far better than the echinoderms and sponges; however, since the echinoderm collections were so immense and such a valuable national resource to scientists, these collections had to become my highest priority for immediate atten-

tion. Consequently, the bryozoan and sea-squirt collections are only now receiving the attention they justly deserve."

ELUSIVE MONKEY

Yellow-tailed woolly monkey, *Lagothrix flavicauda*, from Peru, formerly only known from skins collected by von Humboldt in the early 1800's, and first obtained live in 1976 by former MCZ graduate student Dr. Russell A. Mittermeier now with the World Wildlife Fund and New York Zoological Society. This is the second individual obtained by Dr. Mittermeier in the summer of 1978.



The MCZ Newsletter is published two or three times a year by the Museum of Comparative Zoology, Harvard University, Oxford Street, Cambridge, Massachusetts 02138; A. W. Crompton, Director.

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REPRODUCTION IN REPTILES: NEW BEHAVIOR STUDIES

Associate Professor David Crews has recently received recognition for his pioneering experimental research on the reproductive behavior of reptiles. The American Psychological Association has honored him with the 1979 Early Career Award in the category of Animal Psychology, citing: "For his systematic studies of reproductive behavior among the reptiles. He has contributed to our understanding of the evolution of reproduction by the discovery in reptiles of precursors of social stimulation of neuroendocrine mechanisms previously recognized among birds and mammals . . . His interest in causal mechanisms and adaptive

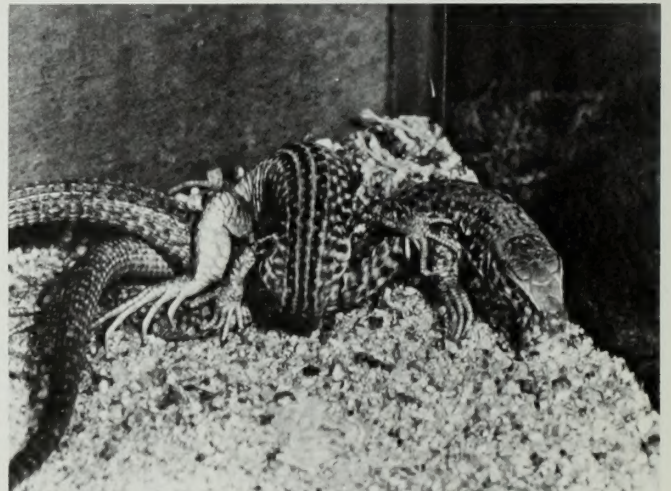
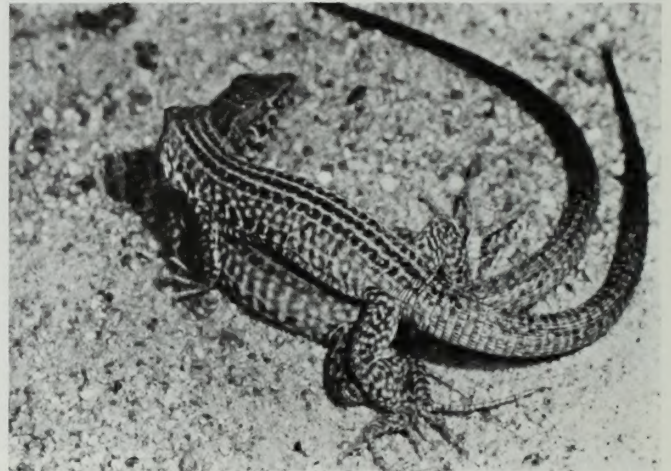
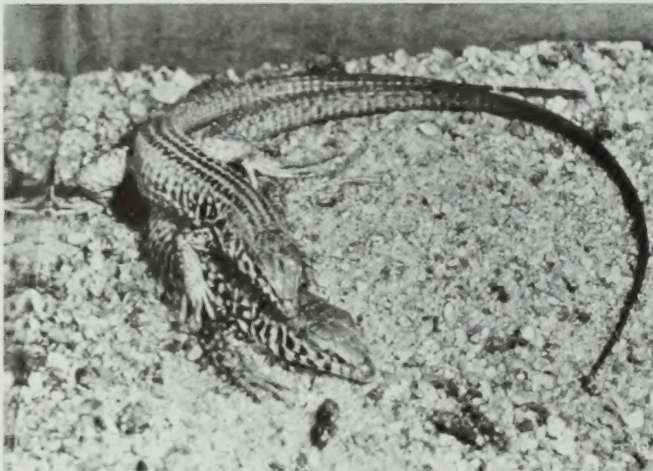
functions of behavior has enabled him to play a leading role in integrating these two aspects of the evolutionary process." He has also been awarded a Sloan Fellowship in Basic Neuroscience. This award is given to "young scientists showing exceptional potential to make creative contributions to scientific knowledge. The fellowships run for two years and are in the amount of \$10,000 a year."

Two major areas of current research in Dr. Crews' lab include a study of parthenogenetic reproduction ("virgin" birth) in whiptail lizards from the American southwest, and the pheromones involved in the reproductive be-

havior of garter snakes from Canada.

Sex and the Single Lizard

It was only in 1960 that it was discovered that some lizards reproduce parthenogenetically rather than sexually; at last count there were 27 such all-female species of reptiles. In sexual reproduction, the egg produces half of the normal chromosomes which, when added to the sperm's chromosomes, make the complete set; in parthenogenetic species, the eggs are chromosomally complete in themselves and, consequently, only female offspring, genetically identical to the mother, result. It has been hypothesized that parthenogenetic whiptails may have evolved from the hybridization of two sexual *Cnemidophorus* species. (For a more complete treatment of



Sequence A. Male whiptail lizard (*Cnemidophorus tigris*) mounting a female and assuming mating posture.

this subject, see Charles J. Cole, "The Value of Virgin Birth" in *Natural History*, January, 1978.) The evolutionary advantage of needing only one parent to produce offspring becomes the crucial factor in the colonization of newly-disturbed habitats.

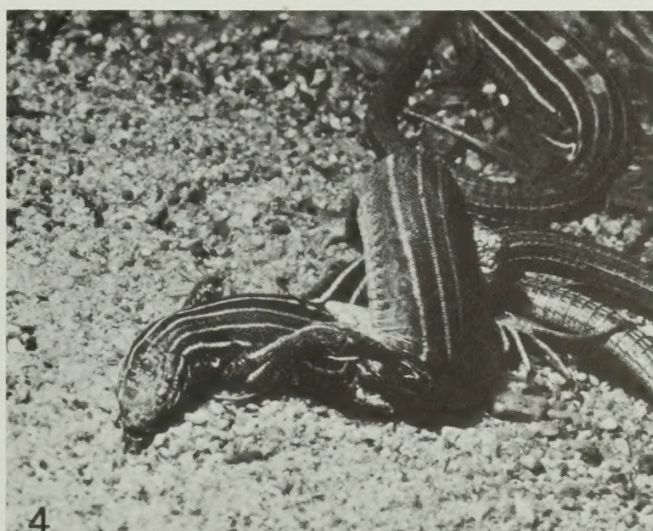
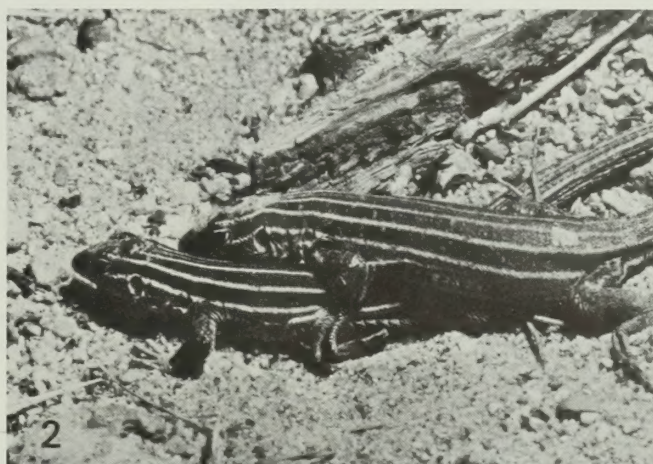
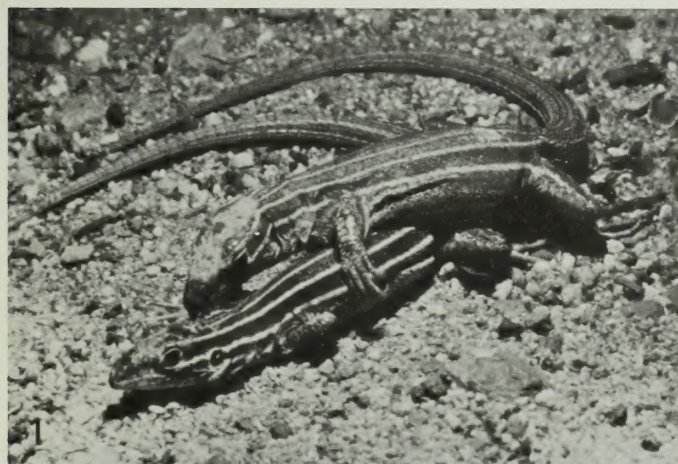
The behavior of parthenogens, however, has never been studied before now. Dr. Crews' recent observations of parthenogenetic and sexual *Cnemidophorus* in the lab have brought some unexpected behavior to light. He has documented, as shown in the two photographic sequences, that *Cnemidophorus uniparens*, one such all-female species, exhibit a behavior that is remarkably similar to the mating behavior of sexual *Cnemidophorus*. Sequence A shows a male *C. tigris* mounting a female and assuming the somewhat con-

torted mating posture characteristic of whiptail lizards; Sequence B shows the identical behavior in *C. uniparens*; of course, in this case, both animals are female. Further investigation revealed that the female being mounted is always preovulatory with large yolking follicles; the mounting female, on the other hand, is either reproductively inactive or postovulatory. Jill Gustafson, an undergraduate in Dr. Crews' lab, has been conducting experiments on the function of this behavior. She has found that, like the male's behavior in sexual species, this male-like behavior in *C. uniparens* is important in the reproductive biology of this species. Thus, it would appear that while sex (male and female) can be dispensed with, sexuality (masculinity and femininity) is necessary for reproduction. In other experi-

ments, Dr. Crews has been able to elicit this behavior by treatment with androgenic hormones. Dr. Crews is also hormonally treating eggs in the lab to find out if it is possible to create a male.

Snake Mating Balls

Behavioral observation and physiological analysis are also producing interesting new insights into the reproductive behavior of garter snakes. In Canada and the northwestern United States, large numbers of garter snakes spend the winter in underground dens. When spring arrives, the males come out first, en masse, and wait in the immediate area for the females who emerge in twos and threes some days later. Because of this pattern of emergence, as many as 50 males, attracted by a pheromone produced by the female, may confront the female as



Sequence B. Two female whiptail lizards (*Cnemidophorus uniparens*) showing identical behavior.



Photo by Michael Aleksiak

A "mating ball" of garter snakes in the field.

she appears. The result is a large, writhing mass of snakes, called a "mating ball." Only one male is

able to mate with the female and the other males, repelled by a pheromone emitted by the success-

ful male, retreat from the copulating pair. These males return to the denning area to wait for the next few females to emerge.

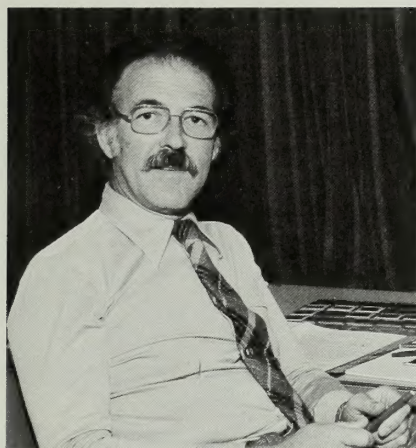
Mating garter snakes in the laboratory.



Photo by Kenneth I. Miyata

VISITORS

Ewald Weibel



Professor Ewald Weibel, who is Chairman of the Department of Anatomy at the University of Berne, Switzerland, is a Visiting Alexander Agassiz Professor in the MCZ this Fall. A leading expert on lung structure and function, Dr. Weibel is taking part in a course on the respiratory system sponsored jointly by the Biology Department, the School of Public Health, and the Medical School.

During his stay Dr. Weibel will also evaluate data compiled with Dr. C. Richard Taylor in Kenya in 1977 on the relationship of body size and the amount of oxygen required for locomotion. Dr. Weibel is concerned with how the animal acquires sufficient oxygen while Dr. Taylor looks at how the animal spends it. Animals ranging in size from the dik-dik to the eland have been used for this comparative study.

Allan C. Wilson

Allan C. Wilson, Professor of Biochemistry, University of California at Berkeley, is spending his sabbatical year at the MCZ pursuing research interests in molecular and organismal evolution with the support of a Fellowship from the John Simon Guggenheim Memorial Foundation.

In this second Guggenheim-supported year (the previous one was in 1972-73), Dr. Wilson's research plan "... is to focus on the population genetics of karyotypic

mutations (i.e., mutations that alter the number of chromosomes or chromosomal arms per cell)." He states in his research proposal: "I am particularly intrigued by the phenomenon of 'hot spots' in karyotypic evolution. These are short periods in the evolutionary history of a lineage when many chromosomal mutations are fixed. ... To understand these 'hot spots', it seems essential to consider theoretically the joint effects of fluctuating population size and mutation rate (and possibly fluctuating heterozygote disadvantage as well) on the rate of evolution. Dr. Lewontin's laboratory is an ideal place in which to pursue such a theoretical problem."

Dr. Wilson plans to work with several other MCZ staff members during his stay. With Professors Stephen Gould and Ernst Mayr, he looks forward to discussions of theoretical problems of evolutionary biology; with Dr. Susan M. Case in the Herpetology Department, he will test a quantitative yardstick he has developed for analyzing morphological evolution; with Professor Karel F. Liem, he hopes to initiate a project to compare the mean rate of morphological evolution of the cichlid fishes of Lake Victoria with that of hominoid primates; and with Professors Frank M. Carpenter and E. O. Wilson, he will examine rates of chromosomal evolution in insects, both extinct and extant, solitary and social.

PROFESSOR LEVI STUDIES SPIDERS IN NEW GUINEA

Last March, Dr. Herbert W. Levi was invited to accompany three ethologists from the Smithsonian Tropical Research Institute to New Guinea. A specialist in orb-weaving spiders, he served as the taxonomic advisor for a study of various aspects of spider behavior.

His task was a challenging one since there are over 35,000 known kinds of spiders, many as yet unnamed. Dr. Levi has found the sys-

tematic work on the collected spiders frustrating, even though the MCZ has one of the best libraries for this purpose and houses one of the largest collections in the world. Many of the old descriptions were found to be inadequate, and it has been difficult to obtain critical specimens needed for comparison from smaller European collections.

He did not, however, find the visit to New Guinea frustrating in the least. The lush, relatively-undisturbed flora was ideal for the comparative field studies which attempted to answer such questions as: what is the relationship between the shape of a web and the behavior of a spider? and, how did one spider genus evolve from being asocial to social?

Since New Guinea was virtually unexplored until 1930, there is still much to discover on this mountainous island with its varied isolated habitats. Dr. Levi is enthusiastic about planning and accompanying a Friends of the MCZ tour of this island; details will be forthcoming as plans develop.



Photo by H. W. Levi

Numerous females of a yet-unnamed social Theridiid spider from New Guinea descending in their web in a collaborative effort to overpower a grasshopper ensnared in the web's lower end.

STAFF NOTICES

Donald B. Brinkman

Donald Brinkman has joined the Vertebrate Paleontology Department as a Curatorial Assistant to help Charles Schaff reorganize the collections of fossil reptiles and amphibians under a two-year grant from the National Science Foundation. A recent Ph.D. recipient from McGill University (thesis topic: the evolution of the tarsus), Don is a native of Craigmyle, Alberta and received his undergraduate degree from the University of Alberta.

The MCZ's fossil collections are very strong in reptiles and amphibians, the latter largely collected by the late Professor Alfred S. Romer; this fact made this position especially attractive to Dr. Brinkman, who is classified as a "reptile man" on the basis of his research interests.



Catherine (Caty) Kessler

Although she has recently been appointed Curatorial Associate for the spider, coelenterate, and crustacean collections, Caty Kessler is no newcomer to the MCZ. Her first MCZ experience was in the summer of 1976 when she volunteered

in the Exhibits Department and developed a herpetology exhibit. Subsequently, she worked on a part-time basis in the Mollusc Department. A Cambridge native, Caty is happy to have found a permanent position here after spending seven years in California (where, among other things, she received a B.S. in Biology at

California State University, Sonoma) and a year in Hawaii studying marine organisms and glass blowing.

Charles R. Schaff Receives Grant

In order to complete excavating and collecting specimens from a Wyoming fossil quarry discovered on the 1977 field trip, Curatorial Associate Charles R. Schaff applied for and received a grant from the National Geographic Society.

The quarry is stratigraphically located within the late Paleocene age (60 million years ago), a time when inter-continental migration of mammals between North America and Asia occurred. Designated Jepsen Valley Quarry, it has already yielded several rare and unusual specimens, including an edentate, subsequently described by Dr. Kenneth D. Rose (*Breviora* 455), which turned out to be the oldest specimen of its kind found to date.

On a return visit last August, Mr. Schaff completed the project successfully collecting additional specimens of archaic primates, insectivores, multituberculates, and condylarths.

PUBLIC PROGRAMS

Scientific Illustration Course Added

In response to increasing demand, a second section of Scientific Illustration, taught by Margaret (Peg) Estey, scientific illustrator in the MCZ, has been added this fall. The first one, taught by Laszlo Meszoly, was completely filled only one week after announcement. This course will be offered again in the spring.

Children's Saturday Mornings and After-School Programs

The Public Education Department is offering two sections of a new course for children this fall. Entitled "A Child's Eye View of Birds" and taught by museum instructors Anndy Dannenberg and Judy Hyman, students are considering the variety of bird form, function, and behavior. Outdoor excursions and classroom activities add a lively dimension to studies of museum collections in both the Peabody and the MCZ.

Travel Program

The **East African Eclipse Safari** led by Professor Don W. Fawcett and organized by Emily Hubbs Scott, currently has twelve people on the waiting list. If it is as successful as anticipated, it will be repeated (minus the eclipse) in 1982.

A two-week cruise of the **Galapagos** archipelago in March aboard the 16-passenger yacht ISABELA is almost filled as of this writing. There is still room for two single men and two single women. Call 617-495-2463 for details.

The *Qualifier 105* has been reserved for the MCZ's usual week, January 28-February 4, 1981 for the perennially popular **Baja** whale-watching cruise and visit to three Pacific Islands where elephant seals, sea lions, and many shore birds abound. Reservations are al-

ready being received for this trip. Those interested should request a complete itinerary which will be available soon.

Currently in the planning stages are a repeat visit to **Hawaii** in March, 1981; a tour of **New Guinea** led by Professor Herbert W. Levi; and a visit to **Australia** and **New Zealand** with newly-appointed Associate Professor and Associate Curator of Mammals John W. Kirsch.

LIBRARY REOPENS

After a summer of furious activity behind closed doors, a hardly-recognizable MCZ Library re-

opened for business on September 15. Astonished staff and students were greeted with open white-painted vistas, circular circulation and reference desks, carpeting microfiche readers, and other wonders of the modern library world. However, not everything is unfamiliar; many of the MCZ's prized treasures have new homes, making a pleasant blend of the old and the new. The limited-access rare books section has been restored in the original Victorian style providing an apt setting for this historic collection.

Librarian Eva Jonas, justly proud of the completion of this Herculean task, claims: "Now we can *really* serve the staff and students."



Librarian Eva Jonas, in the "new" library, appears to have founder Louis Agassiz' blessing.

CLOSE ENCOUNTERS . . . WITH HURRICANES



A park in Santo Domingo, Dominican Republic before DAVID . . .



. . . and after.

This year's turbulent hurricane season was of more than passing interest to Professor Ernest E. Williams, who was collecting lizards in the Dominican Republic with assistant Dr. Susan M. Case on August 31 when hurricane DAVID made his appearance, and for graduate student Lawrence J. Lipke, who was collecting sponges in a dinghy off the coast of Antigua on June 23 when hurricane ANNA arrived.

According to Dr. Williams: "We were in Santiago, in the northern third of the island when DAVID struck on August 31. This was probably the safest place to be since the city is protected by two mountain chains. As it turned out, we were only inconvenienced by the lack of electricity and water but it could have been much worse. On Saturday, we drove down to the river. Many of the townspeople were standing on the banks watch-

ing the river impressively raging and flooding. The homes along the river were totally destroyed; there was no trace left.

Since DAVID was primarily to the south of us, we tried to fly to Puerto Rico on Tuesday, September 4. Unfortunately all flights were cancelled by then because tropical storm FREDERIC was approaching. Flooding had destroyed two bridges on the main road south but we were told of an alternate route recommended by the government. By this time gasoline was strictly rationed; an order from a colonel was necessary.

Someone at an airline office advised us to seek military assistance at the air field adjacent to the airport. Just the mention that we were tourists allowed access to the military authorities at the field. When I stumbled through a Spanish explanation of our problem — including lack of gasoline — we were sent to the fort outside the city. Again the mention that we were tourists worked wonders. The guards waved us in, the military police turned us over to a sergeant and he sent us upstairs to pass through various hands until I found myself shaking the hand of a brigadier general and receiving a safe-conduct typed on the general's calling card. A colonel's signature on another calling card got us gas.

The trip south was completed amid the torrential rains of FREDERIC which lasted until Friday. The farther south we drove, the more extensive damage became. Whole banana plantations were blown down, lying in a sea of red-brown mud. Crops in large areas were totally destroyed. In the capital potable water and food were becoming scarce. There were 32 bridges reported out on the road west and a large portion of the road we had travelled a few days before was destroyed, leaving major portions of the country inaccessible."

Larry Lipke found himself caught in the 12-foot ground swells that herald the arrival of a major storm one mile off the southern shore of Antigua in an eight-foot

inflatable dinghy, which carried Larry and all his diving gear, powered by an outboard motor. Tropical storm ANNA arrived on June 22 and became a full-fledged hurricane on the following day, heading directly for the island.

The sensation was "like being in a hole in the water" according to Mr. Lipke, when he was in the trough of the wave; "all I could see around me was water." Then the dinghy would rise improbably to the top of a 12-foot wall of water,

and descend again. Landing on the beach was out of the question; the 12-foot breakers would have demolished the dinghy and its passenger. He managed to guide his craft into English Harbor, the only protected harbor in the Caribbean, where over 250 yachts from the entire area were arriving. Once he had successfully negotiated the entrance ("you have to ride in between waves") he knew he was safe.

This hurricane did not hit the is-

land but turned away in the middle of the night, leaving Antigua intact.

Mr. Lipke's research, which is concerned with the relationship between the form, function, and evolutionary success of sponges, takes him to the Caribbean frequently. He has observed that there appears to be a connection between the amount of rainfall in the spring and severity of the hurricane season. This year's spring rains were exceptionally heavy.

LARGE POPULATION OF THE GIANT BLACK CAIMAN FOUND IN FRENCH GUIANA

Most of the world's 20-odd crocodilian species are rapidly disappearing throughout their range, primarily because of heavy hunting for the skin trade and incompatibility with man. Many crocodilians have very valuable skins (e.g., an uncured one meter long skin of the southeast Asian estuarine crocodile is worth about \$160), and the larger species, which may reach 20 or more feet in length, are in many cases dangerous to man and his domestic animals and are exterminated whenever possible.

The largest crocodilian in South America (and the largest member of the alligator/caiman family) is the black caiman (*Melanosuchus niger*), which can reach 6 m in length and rates among the world's largest species. This species was once extremely abundant in the Amazonian region.

The famous English lepidopterist and explorer-naturalist Henry Walter Bates, who worked in the Amazonia in the 1850's, stated that: "... it is scarcely exaggerating to say that the waters of the Solimoes (= upper Amazon) are as well stocked with large alligators during the dry season, as a ditch in England is in summer with tadpoles. During a journey of five days which I once made on the Upper Amazons steamer, in November, alligators were seen along the coast almost every step of the way, and the passengers amused themselves, from morning till night, by

firing at them with rifle and ball. They were very numerous in the still bays, where the huddled crowds jostled together, to the great rattling of their coats of mail, as the steamer passed" (Bates, 1863).

Enormous numbers were also to be found at the mouth of the Amazon, especially around the huge delta islands of Marajó and Mexiana, and posed a threat to the cattle ranching operations in this area. To control the huge beasts, the ranchers in this area would hold yearly caiman drives during the season of low water, and would slaughter thousands of black caimans. In this century, the skin trade also took its toll. Federico Medem, the famous Colombian crocodile expert, states that in southern Guyana "the campaign to commercially hunt caimans resulted in such a wholesale slaughter that the lower reaches of the river . . . stank for weeks. . . . A single caiman hunter obtained some 5,000 skins and a second about 700 hides."

The result is that the black caiman is now considered an *endangered* species by the International Union for the Conservation of Nature (IUCN) and is officially protected in all the countries in which it occurs. The problem is that few concentrations of appreciable size remain and enforcement of protective legislation is poor or nonexistent in the remote areas

where black caiman still exist. Only one good population is known to occur in a park or reserve (Manu National Park in Peru), and that in no way approaches the concentrations that once existed.

In July of this year, an expedition led by Dr. Russell A. Mittermeier, formerly of the MCZ, now chairman of the IUCN, Primate Specialist Group and a staff member of World Wildlife Fund, Mark J. Plotkin of the Yale University School of Forestry and Associate of the MCZ's Department of Herpetology, and Isabel Constable of Brown University and a Friend of the MCZ, investigated a little known population of the black caiman in the Kaw region of French Guiana. French Guiana is a small country (actually a department of France in northeastern South America), and is best known as a former penal colony (Devil's Island) and, more recently, the site of the French Space Center.

Although it was not possible to estimate the size of the black caiman population in the Kaw area, the animals are quite abundant and are found together with three other caiman species (the spectacled caiman, *Caiman crocodilus*; and the two dwarf caimans, *Paleosuchus trigonatus* and *Paleosuchus palpebrosus*) — an unusually high density of crocodilian species in one area. Individuals up to five meters in length were seen by the expedition and local inhabitants reported



Photo by Kenneth I. Miyata

A close view of a black caiman from French Guiana.



"Turtle-fishing and adventure with alligator."



From *The Naturalist on the Amazons*, H. W. Bates, 1863.

"Night adventure with alligator."

that still larger animals existed around Kaw.

The Kaw area is important in that it offers a unique opportunity to save a large population of this highly endangered reptile. Only a handful of people live in the area and, though they occasionally hunt the caimans for food, there is no organized slaughter for the skin trade. The area is also rich in other game species, and Mittermeier, Plotkin and Constable hope to convince the French government to set the area aside as a reserve or national park.

It is interesting to note that black caimans are an important link in the aquatic Amazonian ecosystem. Studies conducted by the German ecologist Fittkau in the 1960's indicated that these animals are very important in maintaining fish populations. In the lower Amazon region, where most of the black caimans were exterminated by the skin trade and cattle ranchers, there was a serious decline in valuable fish populations. The reason for this is apparently an interruption in the nutrient chain. Where caiman were once abundant, great quantities of their excrement built up on the bottom of lakes and swamps, and this material formed the main food supply for zoo- and phytoplankton such as bacteria, protozoa, larvae of shrimps and crabs, snails, aquatic insects, and other invertebrates. These same lakes and swamps also serve as an important egg-laying site for most fishes, and their hatchlings immediately find abundant food sources among the animals living on the caiman excrement. When the caiman population declines or is wiped out, there is an accompanying decline in plankton and consequently fish production.

Caimans are also important in controlling some of the larger Amazonian herbivores, like the capybara (a giant rodent that can reach 100 lbs. in weight). In some parts of Brazilian Amazonia, capybaras have become very abundant and destructive to local crops because of population explosions following the elimination of their major predator, the caiman.

